COFFMAN ENGINEERS

May 25, 2022

City of Ponderay
288 4th Street
Ponderay, Idaho 83852

Project: Ponderay Plaza Apartments – Phase 2
Ponderay, ID 83852
CEI Project #212146

Subject: Special Use Permit Application – Stormwater Management Memo

Dear City of Ponderay:

The Ponderay Plaza Apartments – Phase 2 project, located in Ponderay, Idaho, includes the construction of three apartment buildings, three townhomes with 6 units each, and a community building. The project includes the construction of paved parking areas, concrete sidewalks, concrete curbs, paved vehicle circulation, a playground area, landscaping, and stormwater management facilities. The existing project area is relatively flat covered with grass, soil, and various trees. Storm water runoff from the existing site is served by natural sheet flow and infiltrates into the pervious surface.

Storm water management for the project is provided in conformance with the City of Ponderay standards, *Idaho Standards for Public Works Construction*, and *Idaho Department of Environmental Quality (IDEQ) Catalog of Stormwater Best Management Practices*. The Rational Method is used to determine the peak runoff flow with a 25-year return frequency. The stormwater management facilities for the project will be sized to adequately store the entire 25-year storm event, utilizing the SCS Method with a given precipitation from the *NOAA ATLAS 2, Volume V, Idaho*, 25-Year Isopluvial Map.

The design for stormwater treatment and disposal follows the geotechnical recommendations, provided by ALLWEST in their report *Limited Geotechnical Engineering Evaluation*, dated November 10, 2021, included as Attachment C of this memo. The report recommends water quality treatment via bio-infiltration swales and disposal via infiltration galleries with an infiltration rate of 2.5 inches per hour. The swales for this project are designed to treat the first one-half inch of runoff from the pollutant generating impervious surface (PGIS) areas and hydrologically connected non-pollutant generating impervious surface areas, in accordance with the *IDEQ Catalog of Stormwater Best Management Practices.*

Stormwater runoff from the project will be handled by eight (8) on-site drainage basins and five (5) off-site drainage basins. Stormwater from each basin will sheet flow away from all buildings and be directed to stormwater management facilities for treatment, storage, and disposal. Runoff from the pollutant generating impervious surface areas will be directed to bio-infiltration swales, located along the perimeter of the project for treatment and storage. Subsurface infiltration galleries, located below the swales, will assist with storage and disposal. Roof runoff from the buildings will be collected via roof drains and architectural downspouts and piped

directly to subsurface galleries for disposal. Stormwater runoff from the off-site improvements to Bonner Mall Way adjacent to the project site will sheet flow away from the crown of the proposed roadway alignment and will be directed to roadside swales and subsurface galleries for treatment, storage, and disposal. Refer to the Post-Development Basin Map and associated preliminary drainage calculations provided within this memo.

In the case of an unforeseen storm water event where the system capacity is exceeded, stormwater from the central basins on-site will utilize overflow piping and discharge directly to the perimeter stormwater management facilities for additional capacity. If the capacity of the perimeter facilities is exceeded, stormwater will then overland flow to the public right-of-way. If the capacity of the stormwater management facilities for the off-site improvements is exceeded, stormwater will then overland flow north and south to the public right-of-way.

Additional detailed design information, operational characteristics, and perpetual maintenance of stormwater facilities will be provided in a Drainage Report submitted as part of the final civil design package.

Please let us know if you have any comments or if you need additional information to complete your review and approval for this Special Use Permit application. Thank you.

Sincerely,

COFFMAN ENGINEERS, INC.

Christie Johnson, P.E.
Civil Engineer

Chad Heimbigner, P.E., LEED AP
Principal

Enclosure

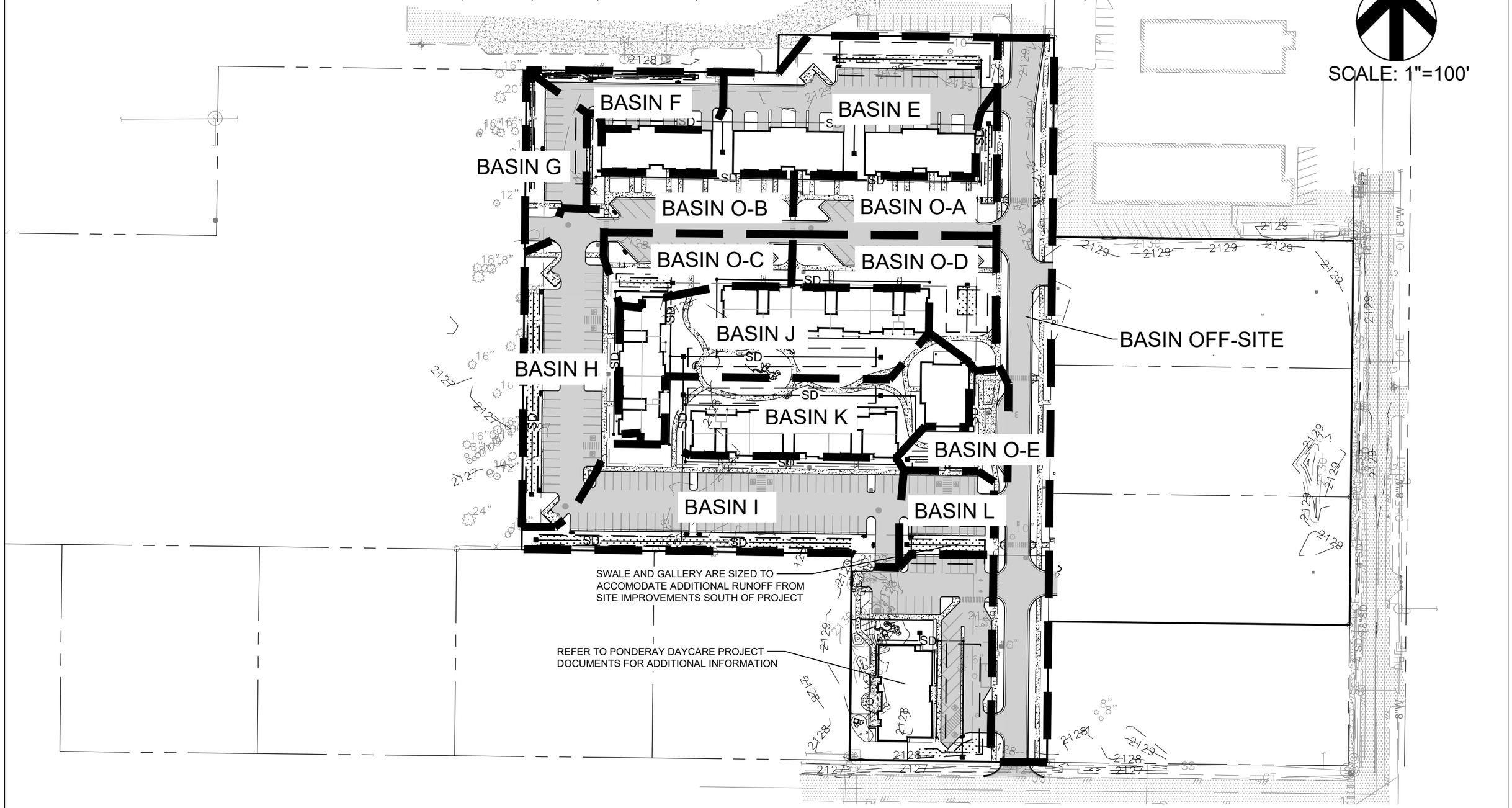
Attachment “A” – Post-Development Basin Map
Attachment “B” – Preliminary Drainage Calculations
Attachment “C” – Geotechnical Report

POST-DEVELOPMENT BASIN MAP

ATTACHMENT “A”

S.11, T.75N., R.2W., BOISE.M., CITY OF PONDERAY, BONNER COUNTY, IDAHO

SCALE: 1"=100'



POST-DEVELOPMENT BASIN MAP

LEGEND

BASIN BOUNDARY

BASIN "A" BASIN DESIGNATION

COFFMAN ENGINEERS
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project PONDERAY PLAZA APARTMENTS PHASE 2	by DLS	sheet no. C2
location PONDERAY, IDAHO	date 5/25/2022	
client EASTMARK CAPITAL GROUP	checked CLJ	job no. 212146
	date 5/25/2022	

PRELIMINARY DRAINAGE CALCULATIONS

ATTACHMENT “B”

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
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BASIN: **Basin E**

CONTRIBUTING AREAS

Site 1.00 Acres 43708 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	14417	0	0.33	0.00	0.90	0.2979	Total Impervious
Sidewalks	0	0	0.000	0.00	0.90	0.0000	0.71
Building / Roof	0	16530	0.00	0.38	0.90	0.3415	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	12761	0.00	0.29	0.15	0.0439	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.29
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.33	0.67		0.68	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	2.00

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 601 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
E	1224	0.50	1716	1.0	2226	735	1725
						735	1725

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.35 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
E	38.0	160.0	3.0	6080	160.0	1.0	125.7	7245.7	7371.4
				6080					7371

SUMMARY

Total Outflow: **0.35 cfs**
Total Storage: **9096 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

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BASIN: **Basin E**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	1.00
Composite "C"	0.68
Volume Provided	9096
Outflow (cfs)	0.35
Area * C" Factor	0.68

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	1.98	797	105.56	691
5	300	2.90	1.98	797	105.56	691
10	600	2.20	1.50	1055	211.11	844
15	900	1.80	1.23	1232	316.67	916
20	1200	1.70	1.16	1513	422.22	1090
25	1500	1.50	1.03	1642	527.78	1114
30	1800	1.30	0.89	1690	633.33	1056
35	2100	1.20	0.82	1806	738.89	1067
40	2400	1.05	0.72	1795	844.44	951
45	2700	1.00	0.68	1915	950.00	965
50	3000	0.97	0.66	2056	1055.56	1001
55	3300	0.95	0.65	2208	1161.11	1047
60	3600	0.88	0.60	2226	1266.67	960
65	3900	0.85	0.58	2325	1372.22	952
70	4200	0.85	0.58	2499	1477.78	1021
75	4500	0.79	0.54	2484	1583.33	901
80	4800	0.76	0.52	2546	1688.89	857
85	5100	0.75	0.51	2666	1794.44	872
90	5400	0.73	0.50	2745	1900.00	845
95	5700	0.70	0.48	2775	2005.56	770
100	6000	0.69	0.47	2877	2111.11	766

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 1114 cf
Storage Provided = 9096 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	5891	91200	-85309

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 1.00 Acres 43708 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.33	98	32.4349	14417
Sidewalks	0.00	98	0.0000	0
Building / Roof	0.38	98	37.1887	16530
Other	0.00	98	0.0000	0
Grass / Landscaping	0.29	69	20.2137	12761
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.71	98.00	0.29	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 6882 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 656 cf

V_{TOT} = 7538 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
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(509) 328-2994

BASIN: **Basin F**

CONTRIBUTING AREAS

Site 0.20 Acres 8533 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	6033	0	0.14	0.00	0.90	0.1246	Total Impervious
Sidewalks	0	0	0.000	0.00	0.90	0.0000	0.14
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	2500	0.00	0.06	0.15	0.0086	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.06
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.14	0.06		0.68	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.39

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 251 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
F	344	0.50	751	1.0	1176	273.75	760
						273.75	760
						Adequate Treatment Volume	

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.05 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
F	6.0	155.0	2.0	930	155.0	1.0	121.7	695.3	817.0
				930					817

SUMMARY

Total Outflow: **0.05 cfs**
Total Storage: **1577 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

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BASIN: **Basin F**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.20
Composite "C"	0.68
Volume Provided	1577
Outflow (cfs)	0.05
Area * C" Factor	0.13

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.39	155	16.15	139
5	300	2.90	0.39	155	16.15	139
10	600	2.20	0.29	206	32.29	174
15	900	1.80	0.24	240	48.44	192
20	1200	1.70	0.23	295	64.58	230
25	1500	1.50	0.20	320	80.73	239
30	1800	1.30	0.17	329	96.88	233
35	2100	1.20	0.16	352	113.02	239
40	2400	1.05	0.14	350	129.17	221
45	2700	1.00	0.13	373	145.31	228
50	3000	0.97	0.13	401	161.46	240
55	3300	0.95	0.13	431	177.60	253
60	3600	0.88	0.12	434	193.75	240
65	3900	0.85	0.11	453	209.90	243
70	4200	0.85	0.11	487	226.04	261
75	4500	0.79	0.11	484	242.19	242
80	4800	0.76	0.10	496	258.33	238
85	5100	0.75	0.10	520	274.48	245
90	5400	0.73	0.10	535	290.63	245
95	5700	0.70	0.09	541	306.77	234
100	6000	0.69	0.09	561	322.92	238

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 261 cf
Storage Provided = 1577 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	1149	13950	-12801

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.20 Acres 8533 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.14	98	13.5729	6033
Sidewalks	0.00	98	0.0000	0
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.06	69	3.9601	2500
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.14	98.00	0.06	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 1342 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 129 cf

V_{TOT} = 1470 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

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BASIN: **Basin G**

CONTRIBUTING AREAS

Site 0.19 Acres 8146 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	5180	0	0.12	0.00	0.90	0.1070	Total Impervious
Sidewalks	196	0	0.004	0.00	0.90	0.0040	0.12
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	2770	0.00	0.06	0.15	0.0095	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.06
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.12	0.06		0.64	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.35

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 224 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
G	400	0.50	835	1.0	1253	308.75	826.5
						308.75	826.5

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.04 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
G	6.0	110.0	2.0	660	110.0	1.0	86.4	493.4	579.8
				660					580

SUMMARY

Total Outflow: **0.04 cfs**
Total Storage: **1406 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

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BASIN: **Basin G**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.19
Composite "C"	0.64
Volume Provided	1406
Outflow (cfs)	0.04
Area * C" Factor	0.12

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.35	141	11.46	129
5	300	2.90	0.35	141	11.46	129
10	600	2.20	0.27	186	22.92	163
15	900	1.80	0.22	218	34.38	183
20	1200	1.70	0.21	267	45.83	221
25	1500	1.50	0.18	290	57.29	233
30	1800	1.30	0.16	298	68.75	229
35	2100	1.20	0.14	319	80.21	238
40	2400	1.05	0.13	317	91.67	225
45	2700	1.00	0.12	338	103.13	235
50	3000	0.97	0.12	363	114.58	248
55	3300	0.95	0.11	390	126.04	264
60	3600	0.88	0.11	393	137.50	255
65	3900	0.85	0.10	410	148.96	261
70	4200	0.85	0.10	441	160.42	281
75	4500	0.79	0.10	438	171.88	267
80	4800	0.76	0.09	449	183.33	266
85	5100	0.75	0.09	471	194.79	276
90	5400	0.73	0.09	484	206.25	278
95	5700	0.70	0.08	490	217.71	272
100	6000	0.69	0.08	508	229.17	279

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 284 cf
Storage Provided = 1406 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	1040	9900	-8860

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.19 Acres 8146 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.12	98	11.6538	5180
Sidewalks	0.00	98	0.4410	196
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.06	69	4.3877	2770
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.12	98.00	0.06	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 1196 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 142 cf

V_{TOT} = 1338 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

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10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin H**

CONTRIBUTING AREAS

Site 0.72 Acres 31253 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	21447	0	0.49	0.00	0.90	0.4431	Total Impervious
Sidewalks	0	950	0.000	0.02	0.90	0.0196	0.51
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	8856	0.00	0.20	0.15	0.0305	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.20
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.49	0.23		0.69	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	1.44

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 894 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
H	2170	0.50	2860	1.0	3568	1257.5	2869
						1257.5	2869

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.18 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
H	15.0	210.0	2.0	3150	210.0	1.0	164.9	2454.0	2619.0
				3150					2619

SUMMARY

Total Outflow: **0.18 cfs**
Total Storage: **5488 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin H**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.72
Composite "C"	0.69
Volume Provided	5488
Outflow (cfs)	0.18
Area * C" Factor	0.49

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	1.43	575	54.69	520
5	300	2.90	1.43	575	54.69	520
10	600	2.20	1.09	762	109.38	652
15	900	1.80	0.89	890	164.06	726
20	1200	1.70	0.84	1092	218.75	873
25	1500	1.50	0.74	1185	273.44	912
30	1800	1.30	0.64	1220	328.13	891
35	2100	1.20	0.59	1303	382.81	921
40	2400	1.05	0.52	1296	437.50	858
45	2700	1.00	0.49	1382	492.19	890
50	3000	0.97	0.48	1484	546.88	937
55	3300	0.95	0.47	1594	601.56	993
60	3600	0.88	0.43	1607	656.25	951
65	3900	0.85	0.42	1678	710.94	967
70	4200	0.85	0.42	1804	765.63	1038
75	4500	0.79	0.39	1793	820.31	973
80	4800	0.76	0.37	1838	875.00	963
85	5100	0.75	0.37	1924	929.69	995
90	5400	0.73	0.36	1981	984.38	997
95	5700	0.70	0.35	2003	1039.06	964
100	6000	0.69	0.34	2077	1093.75	983

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = **1038 cf**
Storage Provided = **5488 cf**
Storage Volume: **Adequate**

Table value at 72 hours:

4320	259200	0.00	0.00	4252	47250	-42998

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.72 Acres 31253 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.49	98	48.2508	21447
Sidewalks	0.02	98	2.1373	950
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.20	69	14.0281	8856
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.51	98.00	0.20	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 4981 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 455 cf

V_{TOT} = 5436 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin I**

CONTRIBUTING AREAS

Site 0.84 Acres 36622 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	21649	0	0.50	0.00	0.90	0.4473	Total Impervious
Sidewalks	0	1932	0.000	0.04	0.90	0.0399	0.54
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	13041	0.00	0.30	0.15	0.0449	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.30
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.50	0.34		0.63	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	1.56

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 902 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
I	3612	0.50	4656	1.0	5718	2067	4665
						2067	4665

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.19 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
I	10.0	330.0	2.0	3300	330.0	1.0	259.2	2536.3	2795.5
				3300					2796

SUMMARY

Total Outflow: **0.19 cfs**
Total Storage: **7461 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
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Spokane, WA 99201
(509) 328-2994

BASIN: **Basin I**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.84
Composite "C"	0.63
Volume Provided	7461
Outflow (cfs)	0.19
Area * C" Factor	0.53

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	1.54	620	57.29	563
5	300	2.90	1.54	620	57.29	563
10	600	2.20	1.17	822	114.58	707
15	900	1.80	0.96	960	171.88	788
20	1200	1.70	0.90	1178	229.17	949
25	1500	1.50	0.80	1279	286.46	992
30	1800	1.30	0.69	1316	343.75	972
35	2100	1.20	0.64	1406	401.04	1005
40	2400	1.05	0.56	1398	458.33	940
45	2700	1.00	0.53	1491	515.63	975
50	3000	0.97	0.52	1601	572.92	1028
55	3300	0.95	0.51	1720	630.21	1090
60	3600	0.88	0.47	1734	687.50	1046
65	3900	0.85	0.45	1810	744.79	1065
70	4200	0.85	0.45	1946	802.08	1144
75	4500	0.79	0.42	1935	859.38	1075
80	4800	0.76	0.40	1982	916.67	1066
85	5100	0.75	0.40	2076	973.96	1102
90	5400	0.73	0.39	2137	1031.25	1106
95	5700	0.70	0.37	2161	1088.54	1073
100	6000	0.69	0.37	2240	1145.83	1095

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 1144 cf
Storage Provided = 7461 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	4587	49500	-44913

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.84 Acres 36622 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.50	98	48.7053	21649
Sidewalks	0.04	98	4.3466	1932
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.30	69	20.6572	13041
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.54	98.00	0.30	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 5244 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 670 cf

V_{TOT} = 5915 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin J**

CONTRIBUTING AREAS

Site 0.77 Acres 33559 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	0	0	0.00	0.00	0.90	0.0000	Total Impervious
Sidewalks	0	0	0.000	0.00	0.90	0.0000	0.34
Building / Roof	0	14897	0.00	0.34	0.90	0.3078	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	18662	0.00	0.43	0.15	0.0643	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.43
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.00	0.77		0.48	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	1.09

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.23 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
K	20.0	200.0	3.0	4000	200.0	1.0	157.1	4737.2	4894.2
				4000					4894

SUMMARY

Total Outflow: **0.23 cfs**
Total Storage: **4894 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
10 North Post St., Suite 500
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BASIN: **Basin J**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.77
Composite "C"	0.48
Volume Provided	4894
Outflow (cfs)	0.23
Area * C" Factor	0.37

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	1.08	434	69.44	364
5	300	2.90	1.08	434	69.44	364
10	600	2.20	0.82	575	138.89	436
15	900	1.80	0.67	671	208.33	463
20	1200	1.70	0.63	824	277.78	546
25	1500	1.50	0.56	894	347.22	547
30	1800	1.30	0.48	920	416.67	503
35	2100	1.20	0.45	983	486.11	497
40	2400	1.05	0.39	977	555.56	422
45	2700	1.00	0.37	1042	625.00	417
50	3000	0.97	0.36	1119	694.44	425
55	3300	0.95	0.35	1202	763.89	439
60	3600	0.88	0.33	1212	833.33	379
65	3900	0.85	0.32	1266	902.78	363
70	4200	0.85	0.32	1360	972.22	388
75	4500	0.79	0.29	1353	1041.67	311
80	4800	0.76	0.28	1386	1111.11	275
85	5100	0.75	0.28	1452	1180.56	271
90	5400	0.73	0.27	1494	1250.00	244
95	5700	0.70	0.26	1511	1319.44	192
100	6000	0.69	0.26	1566	1388.89	178

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 547 cf
Storage Provided = 4894 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	3207	60000	-56793

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.77 Acres 33559 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.00	98	0.0000	0
Sidewalks	0.00	98	0.0000	0
Building / Roof	0.34	98	33.5148	14897
Other	0.00	98	0.0000	0
Grass / Landscaping	0.43	69	29.5610	18662
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.34	98.00	0.43	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 3313 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 959 cf

V_{TOT} = 4272 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin K**

CONTRIBUTING AREAS

Site 0.51 Acres 22361 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	0	0	0.00	0.00	0.90	0.0000	Total Impervious
Sidewalks	0	0	0.000	0.00	0.90	0.0000	0.28
Building / Roof	0	12279	0.00	0.28	0.90	0.2537	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	10082	0.00	0.23	0.15	0.0347	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.23
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.00	0.51		0.56	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.84

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.19 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
L	16.0	200.0	3.0	3200	200.0	1.0	157.1	3777.2	3934.2
				3200					3934

SUMMARY

Total Outflow: **0.19 cfs**
Total Storage: **3934 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin K**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.51
Composite "C"	0.56
Volume Provided	3934
Outflow (cfs)	0.19
Area * C" Factor	0.29

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.84	336	55.56	281
5	300	2.90	0.84	336	55.56	281
10	600	2.20	0.63	445	111.11	334
15	900	1.80	0.52	520	166.67	354
20	1200	1.70	0.49	638	222.22	416
25	1500	1.50	0.43	693	277.78	415
30	1800	1.30	0.37	713	333.33	380
35	2100	1.20	0.35	762	388.89	373
40	2400	1.05	0.30	758	444.44	313
45	2700	1.00	0.29	808	500.00	308
50	3000	0.97	0.28	868	555.56	312
55	3300	0.95	0.27	932	611.11	321
60	3600	0.88	0.25	940	666.67	273
65	3900	0.85	0.25	981	722.22	259
70	4200	0.85	0.25	1055	777.78	277
75	4500	0.79	0.23	1049	833.33	215
80	4800	0.76	0.22	1074	888.89	186
85	5100	0.75	0.22	1125	944.44	181
90	5400	0.73	0.21	1158	1000.00	158
95	5700	0.70	0.20	1171	1055.56	116
100	6000	0.69	0.20	1214	1111.11	103

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 416 cf
Storage Provided = 3934 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	2486	48000	-45514

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.51 Acres 22361 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.00	98	0.0000	0
Sidewalks	0.00	98	0.0000	0
Building / Roof	0.28	98	27.6249	12279
Other	0.00	98	0.0000	0
Grass / Landscaping	0.23	69	15.9701	10082
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.28	98.00	0.23	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 2731 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 518 cf

V_{TOT} = 3249 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin L**

CONTRIBUTING AREAS*

Site 0.34 Acres 14853 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	11267	0	0.26	0.00	0.90	0.2328	Total Impervious
Sidewalks	0	916	0.000	0.02	0.90	0.0189	0.28
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	2670	0.00	0.06	0.15	0.0092	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.06
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
**contributing areas include portions of site imprvoements from north of project*			0.26	0.08		0.77	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.76

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 469 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
J	815	0.50	1098	1.0	1400	478.25	1107.5
						478.25	1107.5

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.18 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
J	40.0	78.0	2.0	3120	78.0	1.0	61.3	2471.5	2532.8
				3120					2533

SUMMARY

Total Outflow: **0.18 cfs**
Total Storage: **3640 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
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Spokane, WA 99201
(509) 328-2994

BASIN: **Basin L**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.34
Composite "C"	0.77
Volume Provided	3640
Outflow (cfs)	0.18
Area * C" Factor	0.26

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.76	304	54.17	250
5	300	2.90	0.76	304	54.17	250
10	600	2.20	0.57	403	108.33	295
15	900	1.80	0.47	471	162.50	308
20	1200	1.70	0.44	577	216.67	361
25	1500	1.50	0.39	627	270.83	356
30	1800	1.30	0.34	645	325.00	320
35	2100	1.20	0.31	689	379.17	310
40	2400	1.05	0.27	685	433.33	252
45	2700	1.00	0.26	731	487.50	244
50	3000	0.97	0.25	785	541.67	243
55	3300	0.95	0.25	843	595.83	247
60	3600	0.88	0.23	850	650.00	200
65	3900	0.85	0.22	888	704.17	183
70	4200	0.85	0.22	954	758.33	196
75	4500	0.79	0.21	949	812.50	136
80	4800	0.76	0.20	972	866.67	105
85	5100	0.75	0.20	1018	920.83	97
90	5400	0.73	0.19	1048	975.00	73
95	5700	0.70	0.18	1060	1029.17	30
100	6000	0.69	0.18	1099	1083.33	15

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 361 cf
Storage Provided = 3640 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	2249	46800	-44551

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.34 Acres 14853 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.26	98	25.3482	11267
Sidewalks	0.02	98	2.0608	916
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.06	69	4.2293	2670
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.28	98.00	0.06	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 2709 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 137 cf

V_{TOT} = 2847 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-A**

CONTRIBUTING AREAS

Site 0.29 Acres 12508 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	6324	0	0.15	0.00	0.90	0.1307	Total Impervious
Sidewalks	0	1671	0.000	0.04	0.90	0.0345	0.18
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	4513	0.00	0.10	0.15	0.0155	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.10
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.15	0.14		0.63	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.53

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 264 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
O-A	441	0.50	660	1.0	897	275.25	669
						275.25	669
						Adequate Treatment Volume	

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.06 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
O-A	14.0	80.0	3.0	1120	80.0	1.0	62.8	1318.9	1381.7
				1120					1382

SUMMARY

Total Outflow: **0.06 cfs**
Total Storage: **2051 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-A**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.29
Composite "C"	0.63
Volume Provided	2051
Outflow (cfs)	0.06
Area * C" Factor	0.18

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.52	211	19.44	191
5	300	2.90	0.52	211	19.44	191
10	600	2.20	0.40	279	38.89	240
15	900	1.80	0.33	326	58.33	268
20	1200	1.70	0.31	400	77.78	322
25	1500	1.50	0.27	434	97.22	337
30	1800	1.30	0.23	447	116.67	330
35	2100	1.20	0.22	478	136.11	341
40	2400	1.05	0.19	475	155.56	319
45	2700	1.00	0.18	506	175.00	331
50	3000	0.97	0.18	544	194.44	349
55	3300	0.95	0.17	584	213.89	370
60	3600	0.88	0.16	589	233.33	355
65	3900	0.85	0.15	615	252.78	362
70	4200	0.85	0.15	661	272.22	389
75	4500	0.79	0.14	657	291.67	365
80	4800	0.76	0.14	673	311.11	362
85	5100	0.75	0.14	705	330.56	375
90	5400	0.73	0.13	726	350.00	376
95	5700	0.70	0.13	734	369.44	365
100	6000	0.69	0.12	761	388.89	372

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 389 cf
Storage Provided = 2051 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	1558	16800	-15242

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin: 0.29 Acres; 12508 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.15	98	14.2275	6324
Sidewalks	0.04	98	3.7594	1671
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.10	69	7.1487	4513
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.18	98.00	0.10	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 1778 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 232 cf

V_{TOT} = 2010 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
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BASIN: **Basin O-B**

CONTRIBUTING AREAS

Site 0.29 Acres 12574 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	6157	0	0.14	0.00	0.90	0.1272	Total Impervious
Sidewalks	0	1671	0.000	0.04	0.90	0.0345	0.18
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	4746	0.00	0.11	0.15	0.0163	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.11
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.14	0.15		0.62	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.52

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 257 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
O-B	462	0.50	601	1.0	747	265.75	604.5
						265.75	604.5

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.08 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
O-B	18.0	80.0	3.0	1440	80.0	1.0	62.8	1702.9	1765.7
				1440					1766

SUMMARY

Total Outflow: **0.08 cfs**
Total Storage: **2370 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-B**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.29
Composite "C"	0.62
Volume Provided	2370
Outflow (cfs)	0.08
Area * C" Factor	0.18

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.52	208	25.00	183
5	300	2.90	0.52	208	25.00	183
10	600	2.20	0.39	275	50.00	225
15	900	1.80	0.32	321	75.00	246
20	1200	1.70	0.30	394	100.00	294
25	1500	1.50	0.27	428	125.00	303
30	1800	1.30	0.23	440	150.00	290
35	2100	1.20	0.21	471	175.00	296
40	2400	1.05	0.19	468	200.00	268
45	2700	1.00	0.18	499	225.00	274
50	3000	0.97	0.17	536	250.00	286
55	3300	0.95	0.17	576	275.00	301
60	3600	0.88	0.16	580	300.00	280
65	3900	0.85	0.15	606	325.00	281
70	4200	0.85	0.15	651	350.00	301
75	4500	0.79	0.14	647	375.00	272
80	4800	0.76	0.14	663	400.00	263
85	5100	0.75	0.13	695	425.00	270
90	5400	0.73	0.13	715	450.00	265
95	5700	0.70	0.12	723	475.00	248
100	6000	0.69	0.12	750	500.00	250

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 303 cf
Storage Provided = 2370 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	1535	21600	-20065

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.29 Acres 12574 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.14	98	13.8518	6157
Sidewalks	0.04	98	3.7594	1671
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.11	69	7.5178	4746
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.18	98.00	0.11	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 1741 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 244 cf

V_{TOT} = 1985 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-C**

CONTRIBUTING AREAS

Site 0.27 Acres 11789 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	6073	0	0.14	0.00	0.90	0.1255	Total Impervious
Sidewalks	0	1064	0.000	0.02	0.90	0.0220	0.16
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	4652	0.00	0.11	0.15	0.0160	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.11
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.14	0.13		0.60	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.48

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 253 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
O-C	550	0.50	754	1.0	976	326	763
						326	763

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.06 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
O-C	18.0	55.0	3.0	990	55.0	1.0	43.2	1170.7	1213.9
				990					1214

SUMMARY

Total Outflow: **0.06 cfs**
Total Storage: **1977 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
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Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-C**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.27
Composite "C"	0.60
Volume Provided	1977
Outflow (cfs)	0.06
Area * C" Factor	0.16

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.47	191	17.19	173
5	300	2.90	0.47	191	17.19	173
10	600	2.20	0.36	252	34.38	218
15	900	1.80	0.29	295	51.56	243
20	1200	1.70	0.28	362	68.75	293
25	1500	1.50	0.25	393	85.94	307
30	1800	1.30	0.21	404	103.13	301
35	2100	1.20	0.20	432	120.31	312
40	2400	1.05	0.17	429	137.50	292
45	2700	1.00	0.16	458	154.69	303
50	3000	0.97	0.16	492	171.88	320
55	3300	0.95	0.16	528	189.06	339
60	3600	0.88	0.14	533	206.25	326
65	3900	0.85	0.14	556	223.44	333
70	4200	0.85	0.14	598	240.63	357
75	4500	0.79	0.13	594	257.81	337
80	4800	0.76	0.12	609	275.00	334
85	5100	0.75	0.12	638	292.19	346
90	5400	0.73	0.12	657	309.38	347
95	5700	0.70	0.11	664	326.56	337
100	6000	0.69	0.11	688	343.75	345

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 357 cf
Storage Provided = 1977 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	1409	14850	-13441

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin: 0.27 Acres; 11789 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.14	98	13.6629	6073
Sidewalks	0.02	98	2.3938	1064
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.11	69	7.3689	4652
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.16	98.00	0.11	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 1587 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 239 cf

V_{TOT} = 1826 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
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Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-D**

CONTRIBUTING AREAS

Site 0.33 Acres 14443 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	6230	0	0.14	0.00	0.90	0.1287	Total Impervious
Sidewalks	0	1125	0.000	0.03	0.90	0.0232	0.17
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	7088	0.00	0.16	0.15	0.0244	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.16
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.14	0.19		0.53	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.52

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 260 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
O-D	600	0.50	759	1.0	936	339.75	768
						339.75	768

Adequate Treatment Volume

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.07 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
O-D	20.0	58.0	3.0	1160	58.0	1.0	45.6	1373.8	1419.3
				1160					1419

SUMMARY

Total Outflow: **0.07 cfs**
Total Storage: **2187 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

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BASIN: **Basin O-D**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.33
Composite "C"	0.53
Volume Provided	2187
Outflow (cfs)	0.07
Area * C" Factor	0.18

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.51	206	20.14	185
5	300	2.90	0.51	206	20.14	185
10	600	2.20	0.39	272	40.28	232
15	900	1.80	0.32	318	60.42	258
20	1200	1.70	0.30	390	80.56	310
25	1500	1.50	0.26	424	100.69	323
30	1800	1.30	0.23	436	120.83	315
35	2100	1.20	0.21	466	140.97	325
40	2400	1.05	0.19	463	161.11	302
45	2700	1.00	0.18	494	181.25	313
50	3000	0.97	0.17	531	201.39	329
55	3300	0.95	0.17	570	221.53	348
60	3600	0.88	0.16	575	241.67	333
65	3900	0.85	0.15	600	261.81	338
70	4200	0.85	0.15	645	281.94	363
75	4500	0.79	0.14	641	302.08	339
80	4800	0.76	0.13	657	322.22	335
85	5100	0.75	0.13	688	342.36	346
90	5400	0.73	0.13	708	362.50	346
95	5700	0.70	0.12	716	382.64	334
100	6000	0.69	0.12	743	402.78	340

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 363 cf
Storage Provided = 2187 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	1520	17400	-15880

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin: 0.33 Acres; 14443 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.14	98	14.0161	6230
Sidewalks	0.03	98	2.5310	1125
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.16	69	11.2275	7088
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.17	98.00	0.16	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 1636 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 364 cf

V_{TOT} = 2000 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-E**

CONTRIBUTING AREAS

Site 0.18 Acres 7982 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	1889	0	0.04	0.00	0.90	0.0390	Total Impervious
Sidewalks	0	2615	0.000	0.06	0.90	0.0540	0.10
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	3478	0.00	0.08	0.15	0.0120	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.08
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.04	0.14		0.57	

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.31

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 79 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
O-E1	153	0.50	265	1.0	396	104.5	274.5
O-E2	71	0.50	134	1.0	215	51.25	143
						155.75	417.5
						Adequate Treatment Volume	

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.06 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
O-E	18.0	60.0	3.0	1080	60.0	1.0	47.1	1277.2	1324.3
				1080					1324

SUMMARY

Total Outflow: **0.06 cfs**
Total Storage: **1742 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin O-E**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.18
Composite "C"	0.57
Volume Provided	1742
Outflow (cfs)	0.06
Area * C" Factor	0.11

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.30	122	18.75	104
5	300	2.90	0.30	122	18.75	104
10	600	2.20	0.23	162	37.50	125
15	900	1.80	0.19	189	56.25	133
20	1200	1.70	0.18	232	75.00	157
25	1500	1.50	0.16	252	93.75	159
30	1800	1.30	0.14	260	112.50	147
35	2100	1.20	0.13	278	131.25	146
40	2400	1.05	0.11	276	150.00	126
45	2700	1.00	0.11	294	168.75	126
50	3000	0.97	0.10	316	187.50	129
55	3300	0.95	0.10	339	206.25	133
60	3600	0.88	0.09	342	225.00	117
65	3900	0.85	0.09	357	243.75	114
70	4200	0.85	0.09	384	262.50	122
75	4500	0.79	0.08	382	281.25	101
80	4800	0.76	0.08	391	300.00	91
85	5100	0.75	0.08	410	318.75	91
90	5400	0.73	0.08	422	337.50	84
95	5700	0.70	0.07	427	356.25	70
100	6000	0.69	0.07	442	375.00	67

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 159 cf
Storage Provided = 1742 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	905	16200	-15295

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.18 Acres 7982 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.04	98	4.2498	1889
Sidewalks	0.06	98	5.8831	2615
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.08	69	5.5092	3478
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.10	98.00	0.08	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 1002 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 179 cf

V_{TOT} = 1180 cf

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/22*
BY: CLJ

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin Off-Site (Bonner Mall Way)**

CONTRIBUTING AREAS*

Site 0.14 Acres 6000 s.f.

	PGIS Areas (s.f.)	Non-PGIS Areas (s.f.)	PGIS Areas (Ac.)	Non-PGIS Areas (Ac.)	"C"	A*C	
Asphalt	2700	0	0.06	0.00	0.90	0.0558	Total Impervious
Sidewalks	0	1000	0.000	0.02	0.90	0.0207	0.08
Building / Roof	0	0	0.00	0.00	0.90	0.0000	
Gravel	0	0	0.00	0.00	0.61	0.0000	
Grass / Landscaping	0	2300	0.00	0.05	0.15	0.0079	Total Pervious
Unimproved	0	0	0.00	0.00	0.33	0.0000	0.05
Other	0	0	0.00	0.00	0.30	0.0000	
			Total A (PGIS)	Total A (Non-PGIS)		Comp "C"	
			0.06	0.08		0.61	

**area provided per 100 feet of Bonner Mall Way and includes both the west and east half from the crown of the proposed roadway alignment*

RATIONAL METHOD

Time of Conc. (min)	Intensity I*	Q peak (cfs) Q =CIA
5.00	2.90	0.25

**Intensity (I) based on the Idaho Transportation Department, Figure I-C, Zone C, Intensity - Duration - Frequency Curve*

SWALE CALCULATIONS

Required Treatment Volume:
V=A*(0.5in.)/(12in./ft) 113 cf

Provided Treatment Volume:

Swale Number	Bottom Elevation Area (sf)	Depth to Treatment Elevation (ft)	Treatment Elevation Area (sf)	Depth to Top Elevation (ft)	Top Elevation Area (sf)	Treatment Volume (cf)	Storage Volume (cf)
West Roadside	100	0.50	412	1.0	742	128	421
East Roadside	100	0.50	412	1.0	742	128	421
						256	842
						Adequate Treatment Volume	

UNDERGROUND PERCOLATION GALLERIES

Soil Infiltration Rate* 2.5 in/hr
5.78704E-05 ft/sec
Voids in Drainrock 0.4
Gallery Outflow Rate 0.07 cfs

**Soil infiltration rate provided by geotechnical engineer for project specific geotechnical investigation*

Gallery ID Number	Gallery Width (ft)	Bottom Length (ft)	Gallery Depth (ft)	Total Infiltration Area (Bottom Area) (sf)	Pipe Length (ft)	Pipe Diameter (ft)	Pipe Volume (cf)	Drainrock Volume (cf)	Total Gallery Volume (cf)
West Roadside	6.0	100.0	2.0	600	100.0	1.0	78.5	448.6	527.1
East Roadside	6.0	100.0	2.0	600	100.0	1.0	78.5	448.6	527.1
				1200					1054

SUMMARY

Total Outflow: **0.07 cfs**
Total Storage: **1896 cf**

See next page for storage requirement calculations

STORM WATER MANAGEMENT CALCULATIONS - *25 Year Design Storm*

PROJECT: *Ponderay Plaza Apartments Phase 2*
DATE: *5/25/2022*
BY: *CLJ*

COFFMAN ENGINEERS
10 North Post St., Suite 500
Spokane, WA 99201
(509) 328-2994

BASIN: **Basin Off-Site (Bonner Mall Way)**

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Time of Conc. (min)	5.00
Area (Acres)	0.14
Composite "C"	0.61
Volume Provided	1896
Outflow (cfs)	0.07
Area * C" Factor	0.08

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage (cu. ft.) (#5-#6)
5.00	300.00	2.90	0.24	98	20.83	78
5	300	2.90	0.24	98	20.83	78
10	600	2.20	0.19	130	41.67	89
15	900	1.80	0.15	152	62.50	90
20	1200	1.70	0.14	187	83.33	103
25	1500	1.50	0.13	203	104.17	99
30	1800	1.30	0.11	209	125.00	84
35	2100	1.20	0.10	223	145.83	77
40	2400	1.05	0.09	222	166.67	55
45	2700	1.00	0.08	236	187.50	49
50	3000	0.97	0.08	254	208.33	46
55	3300	0.95	0.08	273	229.17	43
60	3600	0.88	0.07	275	250.00	25
65	3900	0.85	0.07	287	270.83	16
70	4200	0.85	0.07	309	291.67	17
75	4500	0.79	0.07	307	312.50	-6
80	4800	0.76	0.06	314	333.33	-19
85	5100	0.75	0.06	329	354.17	-25
90	5400	0.73	0.06	339	375.00	-36
95	5700	0.70	0.06	343	395.83	-53
100	6000	0.69	0.06	355	416.67	-61

BOWSTRING METHOD - REQUIRED STORAGE VOLUME

Maximum storage required by Bowstring = 103 cf
Storage Provided = 1896 cf
Storage Volume: Adequate

Table value at 72 hours:

4320	259200	0.00	0.00	727	18000	-17273

Swale / Infiltration Gallery drains within 72 hours

SCS METHOD - 25-YEAR STORM VOLUME

Basin 0.14 Acres 6000 s.f.

	Areas (Ac.)	CN	A*CN	Areas (s.f.)
Asphalt	0.06	98	6.0744	2700
Sidewalks	0.02	98	2.2498	1000
Building / Roof	0.00	98	0.0000	0
Other	0.00	98	0.0000	0
Grass / Landscaping	0.05	69	3.6433	2300
Unimproved	0.00	58	0.0000	0
Gravel	0.00	85	0.0000	0

Impervious A	Impervious CN	Pervious A	Pervious CN
0.08	98.00	0.05	69.00

Impervious
P_{25} = 2.9 in
S = 0.20
Q_{25} = 2.67 in
V_i = 823 cf

Pervious
P_{25} = 2.9 in
S = 4.49
Q_{25} = 0.62 in
V = 118 cf

V_{TOT} = 941 cf

GEOTECHNICAL REPORT

ATTACHMENT “C”

November 10, 2021

Eastmark Capital Group
2212 Queen Anne Ave N #339
Seattle, Washington 98109

Attention: Mr. Sean M. Barnes

RE: Limited Geotechnical Evaluation
Ponderay Land
Schweitzer Plaza Drive and Triangle Drive
Ponderay, Idaho
ALLWEST Project No. 121-411G

Mr. Barnes,

ALLWEST has completed the authorized Limited Geotechnical Evaluation for the property located at Schweitzer Plaza Drive and Triangle Drive in Ponderay, Idaho. The purpose of this evaluation was to characterize the soil and geologic conditions on the property and prepare the attached report with the results of the field evaluation and our geotechnical recommendations to assist with design and construction of the proposed project. Based on our evaluation, the site is suitable for the planned development.

We appreciate the opportunity to work with you on this project. If you have any questions or need additional information, please call us at 208.762.4721.

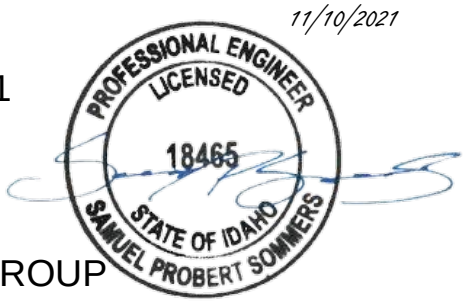
Sincerely,
ALLWEST

Kenneth Rukavina, G.I.T.
Staff Geologist

Samuel P. Sommers, P.E.
Engineering Services Manager

LIMITED GEOTECHNICAL EVALUATION
PONDERAY LAND
SCHWEITZER PLAZA DRIVE AND TRIANGLE DRIVE
PONDERAY, IDAHO
ALLWEST PROJECT NO. 121-411G

11/10/2021



November 10, 2021

Prepared for:
EASTMARK CAPITAL GROUP
2212 QUEEN ANNE AVE N #339
SEATTLE, WASHINGTON 98109

Prepared by:
ALLWEST
690 W. CAPSTONE CT.,
HAYDEN, ID 83835

TABLE OF CONTENTS
LIMITED GEOTECHNICAL EVALUATION
PONDERAY LAND
SCHWEITZER PLAZA DRIVE AND TRIANGLE DRIVE
PONDERAY, IDAHO

EXECUTIVE SUMMARY

ALLWEST has completed the authorized geotechnical evaluation for the Ponderay Land project located at Schweitzer Plaza Drive and Triangle Drive in Ponderay, Idaho. The purpose of this evaluation was to assess the subsurface conditions on the project site with respect to the planned development. This report details the results of the field evaluation and laboratory testing and presents our geotechnical recommendations to assist the design and construction of the planned development. The following geotechnical considerations were identified:

- The topsoil and native soils are unsuitable for use as structural fill.
- We recommend a permanent foundation drainage system be designed and constructed around the perimeter of the structures.
- Two infiltration tests were performed in the northern section of the site, west and east of the existing radio tower. The tests were performed within the silt with sand stratum, just past the topsoil. The percolation rate for both tests was measured to be 5-inches per hour. We recommend a design infiltration rate of 2.5 inches per hour.

Our services were provided in accordance with our proposal no. 121-411G dated September 16, 2021. Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. If we are not retained to provide required construction observation and materials testing services, we cannot be responsible for soil engineering related construction errors or omissions. This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. Section *7.0 EVALUATION LIMITATIONS* should be read for an understanding of the report limitations.

LIMITED GEOTECHNICAL EVALUATION
PONDERAY LAND
SCHWEITZER PLAZA DRIVE AND TRIANGLE DRIVE
PONDERAY, IDAHO

1.0 PROJECT DESCRIPTION

We understand the site is mostly undeveloped, except for an existing radio tower in the northern section of the site. At this time, we evaluated the site conditions specifically for stormwater disposal potential. A separate evaluation for the proposed commercial buildings will be completed when the proposed building locations and approximately footing loads are provided. If the proposed design or loads vary from those stated, we should be notified to review our recommendations and provide additional or revised information, as necessary.

2.0 EVALUATION PROCEDURES

To complete this evaluation, we reviewed soil and geologic literature for the project site and surrounding area. We evaluated the subsurface conditions at the site by excavating twenty-five test pits throughout the project site. Information obtained from the field evaluation, laboratory testing, and geotechnical analyses was utilized to develop the recommendations presented in this report.

3.0 SITE CONDITIONS

The project site is partially developed, 11 acres in total size. Topographically, the property is relatively flat. The property is bordered by multiple developed parcels to the north, U.S. Rte 95 to the west, Schweitzer Plaza Drive to the south, and Triangle drive to the east. The ground coverage consists of mostly grass, soil, and 2 to 24-inch coniferous trees. The property has been partially logged, leaving existing slash piles throughout the site.

3.1 SUBSURFACE CONDITIONS

3.1.1 Published Geologic Information

The geologic conditions in the site vicinity are mapped on the Geologic Map of the Sandpoint Quadrangle, Bonner County, Idaho, by S. Lewis, F. Burmester, M. Breckenridge, E. Box, and D. McFadden, 2006. The project site is mapped as glaciolacustrine deposits (Pleistocene to Holocene), which is described as massive to finely laminated clay, silt, and sand deposited in ice marginal and post glacial lakes in the Purcell Trench.

The USDA Natural Resources Conservation Service (NRCS) has mapped the soils on and around the property predominately as the Mission silt loam and the Odenson silt loam. The Mission silt loam is described as volcanic ash and loess over silty glaciolacustrine deposits. The soil profile

is described as silt, silty clay, and very fine sandy loam. The permeability is slow, and run-off is slow. A season high water table is reported at a depth of 12 inches from February through May. The Odenson soil is described as very deep, poorly drained soil in low areas. It formed in silty glacial lake-laid sediment derived from mixed sources and has a mantle of loess and volcanic ash. The soil profile is described as silt, silty clay, and very fine sandy loam. The permeability is slow, run-off is slow, and the hazard of erosion is none to slight. A seasonal high-water table is reported at a depth of 6 to 24 inches from February to June.

3.1.2 Subsurface Exploration Program

We observed the excavation of 25 test pits at the site on September 28, 2021, and September 29, 2021, utilizing a Bobcat E50 with a 24-inch toothed excavation bucket. The approximate locations of the test pits are shown on Figure A-1, Exploration Location Plan in Appendix A. The soil conditions observed in the test pits were visually described and classified in general accordance with ASTM D 2488 and we logged the subsurface profiles.

Detailed descriptions of the soil observed within the test pits are presented on individual test pit logs in Appendix B of this report. The descriptive soil terms used on the test pit logs, and in this report, can be referenced by the *Unified Soil Classification System (USCS)*. A summary of the USCS is included in Appendix B. The subsurface conditions may vary between exploration locations; such changes in subsurface conditions may not be apparent until construction.

The near surface geologic profile appears to consist of topsoil overlying native fine-grained soils. General descriptions of the observed soil units follow:

Topsoil – Topsoil was encountered in all the test pits. The topsoil layer varied from 6 to 12 inches in thickness.

Native Fine-Grained Soil – Underlying the topsoil we encountered native fine-grained soil, consisting of silt, sand, and clay.

3.2 Groundwater Conditions

We did not encounter groundwater within our explorations. We did not observe surface water on the property during our evaluation. Changes in precipitation, irrigation, construction, or other factors may impact depth to groundwater and the surface water flow on the property and therefore, conditions may be different during construction.

4.0 LABORATORY TESTING

We performed laboratory testing to supplement field classifications and to assess some of the soil engineering properties and parameters. The laboratory testing included liquid and plastic limits (ASTM D 4318), moisture content (ASTM D 2216), fines content (ASTM D 1140). The laboratory test results are included in Appendix C of this report, and some results are also summarized on the test pit logs in Appendix B.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The previous sections of this report presented our understanding of the proposed project and surface and subsurface site conditions. The following conclusions and recommendations are based on this understanding. If the proposed development changes or if unforeseen conditions are encountered, we must be given the opportunity to review the new information and, if necessary, update our recommendations. Additionally, if the geotechnical parameters presented in this report are utilized for the design of structures or retaining walls, we need to be given the opportunity to review the plans and specifications to determine whether the recommendations presented in this report were properly incorporated.

5.1 Site Preparation

Clearing and Stripping: Once temporary erosion and sediment control (TESC) measures are installed, we expect site preparation to continue with clearing and grubbing brush and stripping of organic-rich topsoil. Based on our explorations, the stripping depth for topsoil removal is estimated to be approximately 6 to 12 inches. Clearing and stripping debris should be wasted off-site or used for topsoil within non-structural/landscape areas.

Subgrade Preparation: ALLWEST defines the subgrade as the native soil exposed at the base of excavation prior to placement of fill or concrete. The subgrade requires an evaluation by the geotechnical engineer of record or staff under their supervision to confirm the site conditions are consistent with those observed during our geotechnical evaluation. The subgrade should be moisture conditioned to within two percentage points of the optimum moisture content for compaction. The subgrade should then be compacted to a firm and unyielding condition.

In the event the exposed subgrade becomes unstable, yielding, or unable to be compacted due to high moisture conditions or construction traffic, we recommend that the materials be removed to a sufficient depth to develop stable subgrade soils that can be compacted to the minimum recommended levels. The severity of construction problems will be dependent, in part, on the precautions that are taken by the contractor to protect the subgrade soils.

5.2 Excavation

Based on the conditions observed within our explorations, we anticipate excavation of the on-site soil can be achieved with typical excavation equipment. Temporary excavation slope stability is a function of many factors, including:

- The presence and abundance of groundwater;
- The type and density of the various soil strata;
- The depth of cut;
- Surcharge loadings adjacent to the excavation; and
- The length of time the excavation remains open.

It is exceedingly difficult under the variable circumstances to pre-establish a safe and "maintenance-free" temporary cut slope angle. Therefore, it is the responsibility of the contractor to maintain safe temporary slope configurations since the contractor is continuously at the job site, able to observe the nature and condition of the cut slopes, and able to monitor the subsurface materials and groundwater conditions encountered. Unsupported vertical slopes or cuts deeper than 4 feet are not recommended if worker access is necessary. The cuts should be adequately sloped, shored, or supported to prevent injury to personnel from local sloughing and spalling. The excavation should conform to applicable federal, state, and local regulations. Regarding trench wall support, the site soil is considered Type C soil according to OSHA guidelines and therefore should not exceed a 1.5H:1V (horizontal to vertical) temporary slope.

We recommend that all permanent cut or fill slopes constructed in native soils be designed at a 2H:1V inclination or flatter. All permanent cut and fill slopes should be adequately protected from erosion both temporarily and permanently. Prior to construction ALLWEST should be provided a copy of the final grading plan to determine whether the proposed site grading will affect the recommendations provided in this report.

5.3 Materials

The topsoil and native soils are unsuitable for use as structural fill.

Import materials should consist of granular soil, free of organics, debris, and other deleterious material and meet the following criteria. Import materials should be approved by the Geotechnical Engineer prior to delivery to the site. *Table 1* below presents our recommended requirements for structural fill and utility trench backfill materials.

Fill Type	Criteria
Structural Fill	Maximum size ≤ 3 inches; Retained on ¾-inch sieve <30% Passing No. 200 Sieve ≤ 10%; Non-plastic
Utility-Trench Backfill	Maximum size ≤ 2 inches; Passing No. 200 Sieve ≤ 15%; Non-plastic

Table 1 - Structural fill / utility trench backfill requirements.

5.4 Fill Placement and Compaction

Fill should be placed in lift thicknesses which are appropriate for the compaction equipment used. Typically, eight-inch loose lifts are appropriate for typical rubber tire and steel drum compaction equipment. Lift thicknesses should be reduced to four inches for hand operated compaction equipment. Fill should be moisture conditioned to within two percentage points of the optimum moisture content prior to placement to facilitate compaction. Structural fill and utility trench backfill should be compacted to a minimum of 95 percent of the maximum dry density established by ASTM D1557 (modified Proctor).

5.5 Wet Weather Construction

Due to the climatic effects in this region during late fall, winter, and spring (generally wet conditions), we recommend construction (especially site grading) take place during the summer and early fall season, if possible. If construction occurs during or immediately after excessive precipitation, it may be necessary to over-excavate and replace wet subgrade soil which might otherwise be suitable.

We recommend earthwork for this site be scheduled for the drier seasons of the year. If construction is undertaken in wet periods of the year, it will be important to slope the ground surface to provide drainage away from construction.

5.6 Cold Weather Construction

We recommend removal of frost susceptible soils (soil with fines contents greater than 10 percent) within the frost-depth zone below concrete flatwork (sidewalks, patios, etc.) to reduce the potential detrimental effects of frost heave.

If site grading and construction are anticipated during cold weather, we recommend good winter construction practices be observed. Snow and ice should be removed from excavated and fill areas prior to additional earthwork or construction. Footings, floor slabs or structural portions of the construction should not be placed on frozen ground; nor should the supporting soils for buildings be permitted to freeze during or after construction. Frozen soils should not be used as backfill or fill.

5.7 Lateral Earth Pressures

Below-grade building walls should be designed to resist lateral earth pressures. *Table 2* below presents the equivalent fluid pressures for structural fill for calculation of lateral earth pressures. For recommendations for site retaining wall design, refer to the section *5.8 Retaining Walls* of this report.

Condition	Equivalent Fluid Pressure Structural Fill (pcf)
At-rest	55
Active	35
Passive	350

Table 2 - Lateral earth pressures for structural fill.

The above values are for level backfill only and do not account for hydrostatic forces. Walls should be provided with adequate drainage so hydrostatic forces do not adversely affect the walls. We recommend placement of gravel behind walls and/or weep holes to assist with drainage and reduce the potential for the buildup of hydrostatic pressures. Walls that are braced in a manner that does not allow any rotational movement (rigid) (e.g. basement walls) should be designed using the given “at-rest” equivalent fluid pressure. The active and at-rest pressures should be

increased by an equivalent fluid weight of 10 pounds per cubic foot (pcf) and the passive pressure should be reduced by 10 pcf for seismic design. The dynamic component of the active pressure acts at a height of approximately 0.6 times the height of the wall.

5.8 Retaining Walls

At the time this report was prepared we have no knowledge of planned retaining walls for this project. If retaining walls are to be implemented as part of this project ALLWEST should be provided the opportunity to review the plans to determine if further geotechnical evaluation is required. We may need to develop wall specific lateral earth pressures depending on location and height of proposed retaining walls. Our scope of services did not include segmental block design, boulder faced slope design, or global stability analyses; we can provide these services for an additional fee, if requested.

5.9 Seismicity

We anticipate the *2018 International Building Code* (IBC) will be used as the basis for design of the proposed structures. The soil at the site can be characterized as Site Class E for seismic design.

Table 3 below contains seismic parameters that were calculated using USGS U.S. Seismic Design Maps for use with the 2018 IBC. The latitude and longitude for the site were used to specify the location of the subject property.

Latitude (degrees)	Longitude (degrees)	Spectral Accelerations		Site Coefficients	
		Ss	S1	Fa	Fv
48.3062	-116.5421	0.332g	0.112g	2.171	4.2

Table 3 - Seismic design parameters.

5.10 Stormwater and Drainage

We recommend a permanent foundation drainage system be designed and constructed around the perimeter of the structures. The drainage system should consist of a four-inch diameter, Schedule 40 or ADS, perforated pipe surrounded with a free draining aggregate. The pipe should be located at the lowest elevation of the footing trench excavation such that gravity drainage may be achieved. Water collected in the drains should be discharged down-gradient of the structure.

We recommend the grading plan include slopes such that storm water run-off is directed away from the building and pavement areas to a storm water management system. We recommend ground surface adjacent to foundations be sloped a minimum of five percent within ten feet of the building. If the adjoining ground surface consists of hardscapes it may be sloped a minimum of two percent in the first ten feet. Water should not be allowed to infiltrate or pond adjacent to the foundations.

Infiltration Testing: Two infiltration tests were performed in the northern section of the site, west and east of the existing radio tower. The tests were performed within the silt with sand stratum,

just past the topsoil. The percolation rate for both tests was measured to be 5-inches per hour. We recommend an design infiltration rate of 2.5 inches per hour be used.

6.0 ADDITIONAL RECOMMENDED SERVICES

We recommend ALLWEST be retained to provide construction materials testing and observation to verify the soil and geologic conditions and the report recommendations are incorporated into the actual construction. The design engineer of record should determine applicable testing and special inspection requirements in accordance with the governing code documents. If we are not retained to provide required construction observation and materials testing services, we cannot be responsible for soil engineering related construction errors or omissions.

7.0 EVALUATION LIMITATIONS

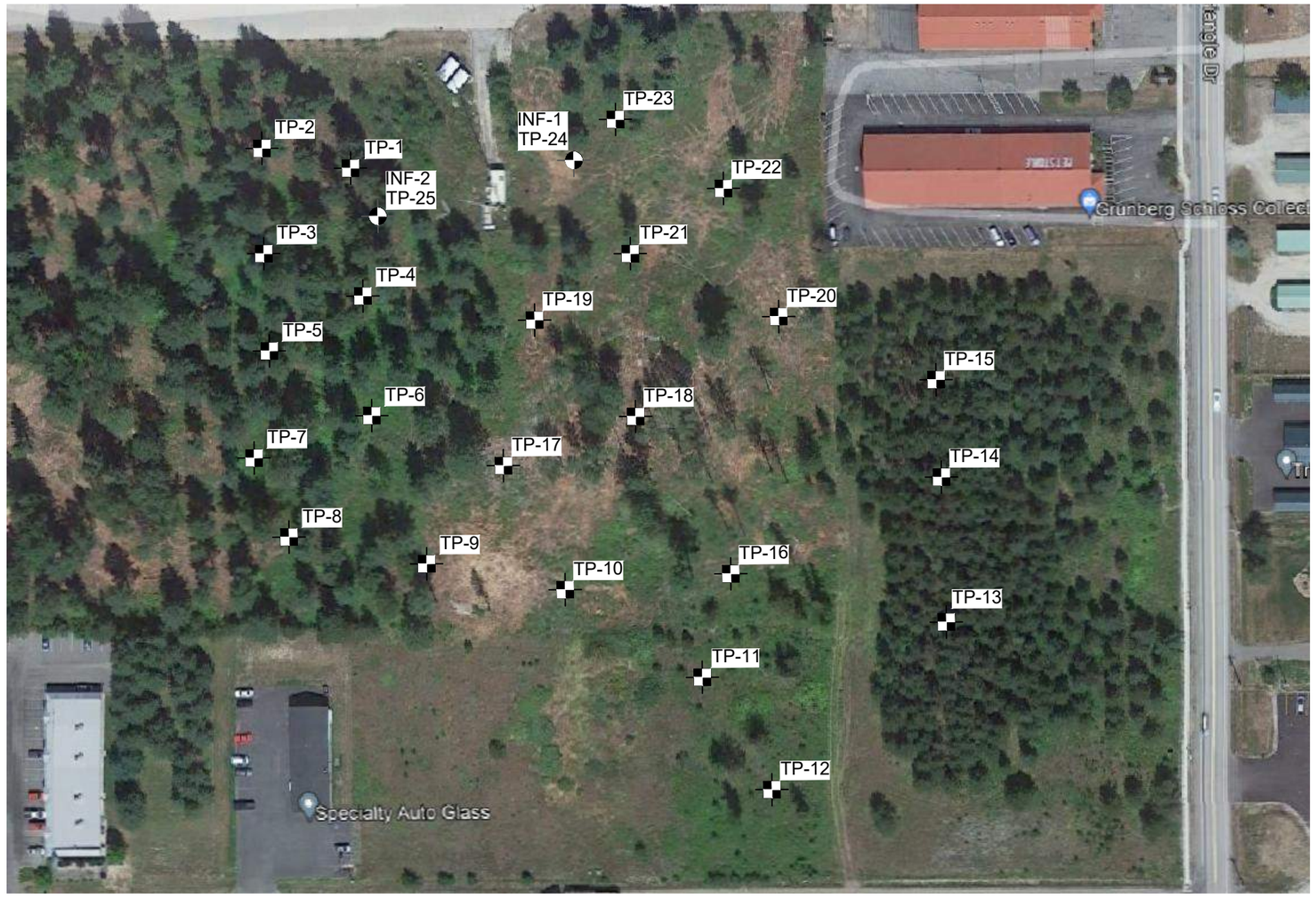
This report has been prepared to assist the planning and design for the Ponderay Land project located at Schweitzer Plaza Drive and Triangle Drive in Ponderay, Idaho. Reliance by any other party is prohibited without the written authorization of ALLWEST. Our services consist of professional opinions and conclusions made in accordance with generally accepted geotechnical engineering principles and practices in the local area at the time this report was prepared. This acknowledgement is in lieu of all warranties, express or implied.

The following appendices complete this report:

Appendix A – Site and Exploration Plan
Appendix B – Test Pit Logs, Unified Soil Classification System
Appendix C – Laboratory Test Results

Appendix A

Site and Exploration Plan



BASEMAP SOURCE: GOOGLE EARTH PRO, COPYRIGHT 2021 GOOGLE.

LEGEND:

TP-1 TEST PIT NUMBER AND APPROXIMATE LOCATION

INF-1 INFILTRATION NUMBER AND APPROXIMATE LOCATION

ALLWEST

690 W Capstone Court
Hayden, Idaho 83835
(208) 762-4721
www.allwesttesting.com

FIGURE A-1: SITE AND EXPLORATION PLAN

PROJECT:	121-411G PONDERAY LAND		
LOCATION:	SCHWEITZER PLAZA DR. AND TRIANGLE DR.		
CLIENT NAME:	EASTMARK CAPITAL GROUP		
DATE:	OCTOBER, 2021	SCALE:	NOT TO SCALE

Appendix B

Test Pit Logs
Unified Soil Classification System

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-1

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 11'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist to very moist, stiff to medium stiff.		
11		Test pit TP-1 terminated at 11 feet. No groundwater observed. No caving observed.		
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-2

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist to very moist, stiff to medium stiff.		
10		Test pit TP-2 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-3

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist. Contained roots.		
1	CL	Lean CLAY, gray-brown, moist, stiff.		Liquid and Plastic Limits Test at 3 feet. Liquid Limit = 31 Plastic Limit = 23 Plasticity Index = 8 #200 Wash Test at 3 feet. Silt / Clay = 92%
6	ML	SILT with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-3 terminated at 10 feet. No groundwater observed. No caving observed.		
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-4

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
6	CL	Lean CLAY with interbedded layers of SILT, light brown to gray, moist, medium stiff.		#200 Wash Test at 7 feet. Silt / Clay = 94%
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-4 terminated at 10 feet. No groundwater observed. No caving observed.		
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-5

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 9'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
2				
3				
4				
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
6				
7				
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
9		Test pit TP-5 terminated at 9 feet. No groundwater observed. No caving observed.		
10				
11				
12				
13				
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-6

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, very stiff.		
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY with sand lenses, fine-grained, light brown, very moist, medium stiff.		
10		Test pit TP-6 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-7

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 9'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
9		Test pit TP-7 terminated at 9 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-8

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
2				
3				
4				
5				
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
7				
8	CL	Lean CLAY with sand lenses, fine-grained, light brown, very moist, medium stiff to stiff.		
9				
10		Test pit TP-8 terminated at 10 feet. No groundwater observed. No caving observed.		
11				
12				
13				
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-9

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
2				
3				
4				
5				
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
7				
8	CL	Lean CLAY with sand lenses, fine-grained, light brown, very moist, medium stiff.		
9				
10		Test pit TP-9 terminated at 10 feet. No groundwater observed. No caving observed.		
11				
12				
13				
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-10

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL-ML	Silty CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist to very moist, medium stiff.		Liquid and Plastic Limits Test at 6 feet. Liquid Limit = 27 Plastic Limit = 21 Plasticity Index = 6 Moisture Content Test at 6 feet. Moisture Content = 31.6%
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-10 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-11

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
2				
3				
4				
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
6				
7				
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
9				
10		Test pit TP-11 terminated at 10 feet. No groundwater observed. No caving observed.		
11				
12				
13				
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-12

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-12 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-13

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 11'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist to very moist, medium stiff.		
11		Test pit TP-13 terminated at 11 feet. No groundwater observed. No caving observed.		
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-14

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
2				
3				
4				
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
6				
7	CL	Lean CLAY, light brown, very moist, medium stiff.		
8				
9				
10		Test pit TP-14 terminated at 10 feet. No groundwater observed. No caving observed.		
11				
12				
13				
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-15

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 11'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist to very moist, medium stiff.		
9	CL	Lean CLAY, light brown, very moist, medium stiff.		
11		Test pit TP-15 terminated at 11 feet. No groundwater observed. No caving observed.		
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-16

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-16 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-17

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 9'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
2				
3				
4				
5	ML	Sandy SILT with interbedded layers of SILT, fine-grained, gray to light brown, moist, medium stiff.		
6				
7	CL	Lean CLAY, light brown, very moist, medium stiff.		
8				
9		Test pit TP-17 terminated at 9 feet. No groundwater observed. No caving observed.		
10				
11				
12				
13				
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-18

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
6	ML	SILT with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
9	CL	Lean CLAY, light brown, very moist, medium stiff.		Liquid and Plastic Limits Test at 9 feet. Liquid Limit = 31 Plastic Limit = 22 Plasticity Index = 9
10		Test pit TP-18 terminated at 10 feet. No groundwater observed. No caving observed.		Moisture Content Test at 9 feet. Moisture Content = 29.2%

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-19

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-19 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-20

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 9.5'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
9		Test pit TP-20 terminated at 9.5 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-21

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
6	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-21 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-22

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 9'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
9		Test pit TP-22 terminated at 9 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Rain

TEST PIT TP-23

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-23 terminated at 10 feet. No groundwater observed. No caving observed.		
14				

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Overcast

TEST PIT TP-24

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 10'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist, medium stiff.		
8	CL	Lean CLAY, light brown, very moist, medium stiff.		
10		Test pit TP-24 terminated at 10 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

ALLWEST
HAYDEN, IDAHO
GEOTECHNICAL SECTION

TEST PIT LOG

DATE STARTED: 9/28/2021
DATE FINISHED: 9/28/2021
OPERATOR: Rick Marcus
COMPANY: R&K, LLC
LOGGER: Kenny Rukavina
WEATHER: Overcast

TEST PIT TP-25

EXCAVATOR: Bobcat E50
EXCAVATION METHOD: 24" Toothed Soil Excavation Bucket

PROJECT: 121-411G Ponderay Land

NOTES:

TOTAL DEPTH: 12'

DEPTH (ft)	USCS	DESCRIPTION	GRAPHIC LOG	NOTES
0	TOPSOIL	Topsoil, dark brown, moist.		
1	ML	SILT with sand, gray-brown, moist, stiff.		
5	CL	Lean CLAY with interbedded layers of Sandy SILT, fine-grained, light brown to gray, moist to very moist, medium stiff.		
12		Test pit TP-25 terminated at 12 feet. No groundwater observed. No caving observed.		

WATER LEVELS
▽ WHILE EXCAVATING
▼ AT COMPLETION
▼ AFTER EXCAVATING

Unified Soil Classification System

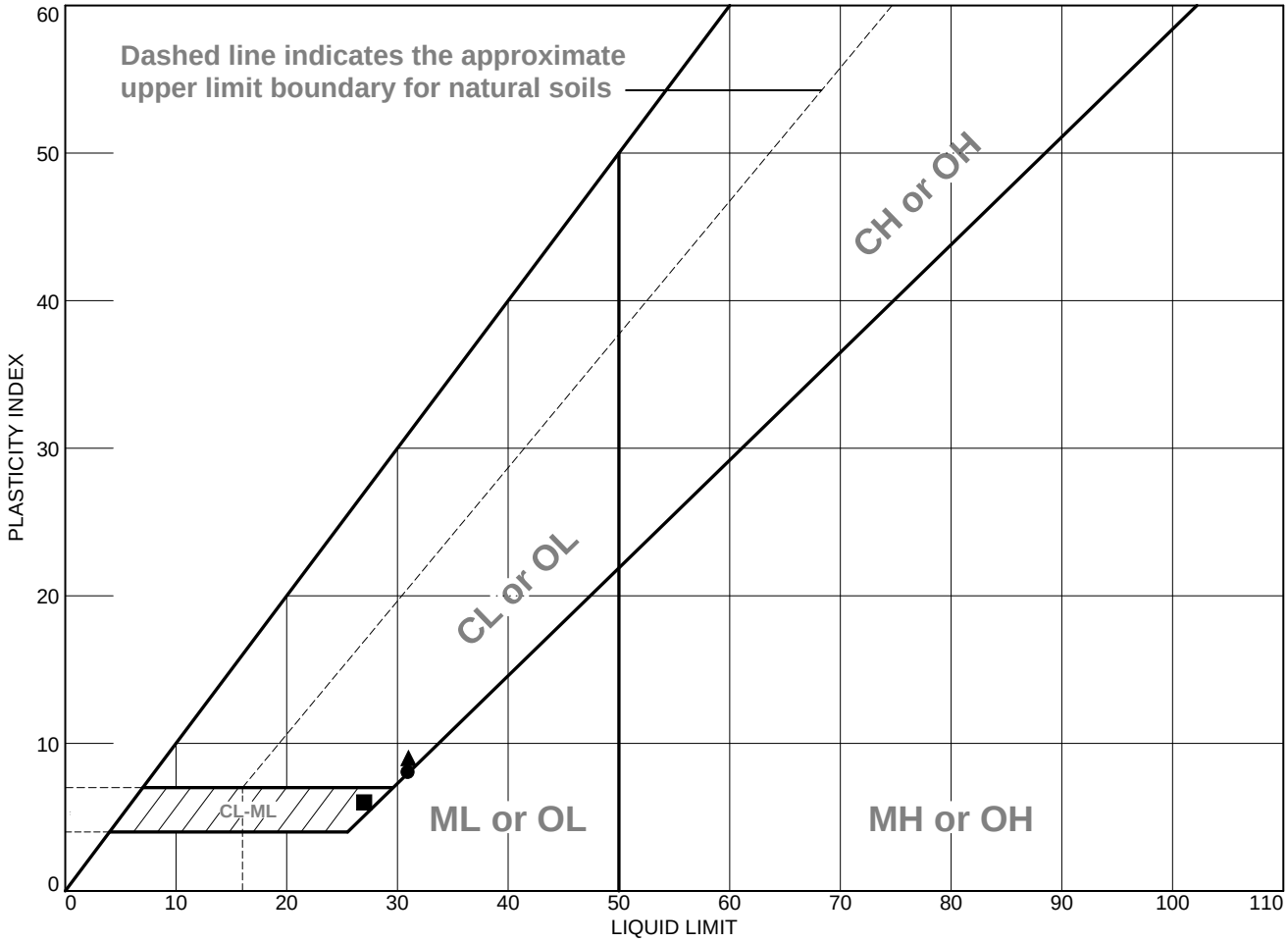
MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS	GRAVELS	CLEAN GRAVELS	GW	Well-Graded Gravel, Gravel-Sand Mixtures.
			GP	Poorly-Graded Gravel, Gravel-Sand Mixtures.
		GRAVELS WITH FINES	GM	Silty Gravel, Gravel-Sand-Silt Mixtures.
			GC	Clayey Gravel, Gravel-Sand-Clay Mixtures.
	SANDS	CLEAN SANDS	SW	Well-Graded Sand, Gravelly Sand.
			SP	Poorly-Graded Sand, Gravelly Sand.
		SANDS WITH FINES	SM	Silty Sand, Sand-Silt Mixtures.
			SC	Clayey Sand, Sand-Clay Mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50%		ML	Inorganic Silt, Silty or Clayey Fine Sand.
			CL	Inorganic Clay of Low to Medium Plasticity, Sandy or Silty Clay.
			OL	Organic Silt and Clay of Low Plasticity.
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH	Inorganic Silt, Elastic Silt, Micaceous Silt, Fine Sand or Silt.
			CH	Inorganic Clay of High Plasticity, Fat Clay.
			OH	Organic Clay of Medium to High Plasticity.
Highly Organic Soils			PT	Peat, Muck and Other Highly Organic Soils.

ALLWEST

Appendix C

Laboratory Test Results

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	31	23	8		92	
■	Silty clay	27	21	6			
▲	Lean clay	31	22	9			
◆	Silt					94	

Project No. 121-411G **Client:** Eastmark Capital Group

Project: Ponderay Land

●**Location:** TP-3 **Depth:** -2.5' **Sample Number:** S121-1090
■**Location:** TP-10 **Depth:** -6' **Sample Number:** S121-1092
▲**Location:** TP-18 **Depth:** -9' **Sample Number:** S121-1093
◆**Location:** TP-4 **Depth:** -7' **Sample Number:** S121-1091

Remarks:
●All Sample By: K.Rukavina
All Sample On: 10/6/21
■Recieved Moisture Content: 31.6%
▲Recieved Moisture Content: 29.2%

ALLWEST

Figure

Tested By: ○ Christian Kreiger □ Christian Kreiger △ Christian Kreiger ◇ Noah White **Checked By:** Chris McKissen